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EXAMINER	
DICUS, TAMRA	

ART UNIT	PAPER NUMBER
1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/776,427	WHITESIDES ET AL.	
	Examiner	Art Unit	
	TAMRA L. DICUS	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09/10/09*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-15,55-59 and 69-75* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-15,55-59 and 69-75* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Prosecution Reopened

In view of the pre-appeal request and conference filed on 09-10-09, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

The finality of the Office action mailed is hereby withdrawn in view of the new ground of rejection set forth below.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3-15, 55-59, and 69-75 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As written, claims 3, 55, and 69 comprise the language "defining a surface" and all places thereafter, reciting "the surface". It is not clear which surface is being referred to, which also makes it unclear where the isolated and continuous regions are. The relation between the self-assembled monolayer, palladium layer, and substrate surfaces need to be clear as all layers inherently have upper and lower surfaces. It is not clear if Applicant is claiming the

interface of the metal and the self-assembled monolayer or the metal and the substrate. Thus, the structure is indefinite.

Further to claim 55, lines 3-4, "the surface defining a pattern" lacks antecedent basis; which makes it further unclear where the pattern is located, if there is a pattern on the claimed device at all, or if the pattern is on some other article not part of the device. In addition, the recitation of "an applicating surface" and every recitation of "the surface" thereafter is unclear.

Note that the end product should be claimed. If Applicant intends for "the substrate defining a surface" to be equal to "the surface defining a pattern", then it is not clear how many surfaces and patterns there are. Thus, the structure is indefinite.

Further to claims 11, 14, and 15, "the surface" makes it unclear to exactly where the nonplanar surface is located.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 69 and 74-75 are rejected under 35 U.S.C. 102(b) as being anticipated by USPN 5,079,600 to Schnur et al.

Schnur teaches a patterned monomolecular assembly (because it is patterned by etching or irradiation methods-7:50-68, 8:1-46, there are discontinuous and therefore isolated regions) having a nonplanar substrate such as a metal coated on the surface of a substrate (such as silicon wafer) that exhibits excellent step coverage important in fabrication of the wafer used in semiconductor microlithography (Example 23, Abstract, Example 25). Further, a metal coating such as gold and palladium is taught.

While not exemplified, metal in general, is treated on the substrate (9:50-68, 8:2-9, 8:46- e.g. “treated at the surface with silicon…metal”, "the first layer can be one type of metal such as palladium”). Thus, it has “palladium defining a surface” as the patent discloses metal as a treatment “at” (meaning directly on) the substrate surface and the metal is taught at col. 8, line 46 to include palladium.

See further col. 25, lines 40-60 to teaching assembled gold surfaces (self-assembled monolayer on metal gold). Schnur also teaches a second species - functional group terminating at an end away (the star and triangle shapes illustrated on the nonpolar tails in Figs. 1A and 1B-see col. 9, lines 10-38) and another first molecular species silane molecule selected to bind the surface of the substrate (smallest circle touching the substrate surface) in a terminal end in a monomolecular self-assembling film being chemisorbed in the same way as

disclosed in the instant specification (see Example 1, further to hydrophobic and hydrophilic functions, and 10:50-68).

Schnur teaches microlithography, etching, and contact printing patterns (equivalent to forming isolated regions-see also the teaching and figures of patterning in FIG. 4A and 5B) are used explaining the pattern line widths of any material including metal, having less than one micron and in Angstrom range (embraces all sizes (linear and area) less than 1 microns (see col. 7, especially lines 1-10, 50-68, overlapping Applicant's lateral dimension ranges of claims 69 and 74-75, less than 200 microns) is suitable for microcircuit lithography (col. 1, lines 60-68, col. 5, lines 15-45, col. 6, lines 45-68, col. 7, col. 8, lines 1-68, col. 9, lines 10-68, col. 10, lines 1-4, lines 40-65, col. 11, lines 1-25, FIGS. 1A-3B , 5B and associated text) patterning on metal coated wafer substrates.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3-15, 55-59, and 70-73 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,079,600 to Schnur et al. in view of USPN 4,728,591 to Clark et al.

Schnur essentially teaches the claimed invention above. Specifically, Schnur taught above in claim 69 applies to claims 3-15, 55-59 and 70-73 except where pointed out below.

Schnur doesn't teach a surrounded region as claimed in 3, 55, and 70-73, while Schnur does teach irradiated patterns by electron bean or contact printing on silicon substrates (because all surfaces are patterned, they are nonplanar as taught by Schnur (claims 11, 14, 15)).

Further, Clark, analogously directed, explicitly teaches the required ranges of similar material are suitable in microlithography patterns on silicon wafers. Clark teaches a device comprising: an article comprising palladium metal defining a surface (col. 2, line 32, e.g. upper substrate surface or an upper metal surface). Clark teaches a metal coating as a film adjacent the substrate or an embedded pattern in nanometer dimensions in the upper layer of a silicon substrate (see 10a layered substrate, and 40 metal embedded and 42 metal island or continuous sheet of FIGS. FIGs. 8c, 8d, respectively, 7:60-68, 8:1-5, 11:55-65, 12:5-35), and an isolated region of a self-assembled monolayer of a first molecular species having a function (col. 2, lines 49-55, e.g. a functional material deposited through holes such as a protein molecules,

equivalent to isolated regions should the pattern include these) surrounded by a second molecular species on the surface (col. 2, lines 40-49, e.g. two-dimensional self-assembled molecular array of protein molecules equivalent to a continuous region should the pattern include these). Clark teaches an isolated region of a self-assembled monolayer of a similar first molecular species having a function (col. 2, lines 49-55, e.g. a functional material deposited through holes such as a protein and enzymes molecules) surrounded by a second molecular species on the surface and terminating in the same way (e.g. at the ends of the pattern as per Applicant's specification-see [0053-0059]) (col. 2, lines 40-49, FIG. 2 and associated text, two-dimensional self-assembled molecular array of protein and enzymes molecules). The isolated region in lateral dimension and area (encompassed by characteristic dimension) is between 1-50 nm (0.01-0.5 microns), meeting Applicant's range of less than about 10 microns, 5 microns, 1 micron, and 0.25 microns, less than 100 sq. microns, less than 25 microns, less than 1 sq. microns, and less than 0.06 microns, as the first material is surround by the pattern via the second molecular species, see col. 3, lines 56-59 and col. 4, lines 40-45. The area printed is at least patterned of several thousand nanostructures in one micron square area, meeting Applicant's area ranges (claims 7-10).

The similar terminations of the second molecular species and the first being on and exposed away from the surface are dependent upon the selected material. Since Clark teaches the material that is self-assembled can be

chemical, proteins, or polymers and other functionable materials (3:1-5, 14:1-65) (col. 13, line 60-col. 14, lines 1-40, col. 14, lines 50-col. 15, line 30, cationic polylysine serve to bind to anionic ferritin), and teaches in col. 16, lines 40-50, polymers that at both ends of its length, and at the respective terminus bind to adjacent islands (isolated regions), one would expect the material to perform functionally as claimed, while not explicitly recited in the same words. See also patented claims, Abstract, col. 2, lines 25-65, 8:1-25, and 10:45-65, 12:5-49, 13:40-65, 14:1-55, 16:50-60.

Thus, it would have been obvious to one having ordinary skill in the art to have modified the irradiated or contact printed pattern of Schnur because Clark teaches the wafer having the required microlithography patterns in nanoscale to produce complex writing structures such as semiconductors or biosensors to allow shorter production times, differential current flow, and /or enhanced protein bonding dependent upon the end use of the device as cited above.

Further, regarding claim 55, because it is unclear if there is a pattern and where it is the Examiner's position that because Clark patterns the substrate as set forth above and Schnur teaches at col. 4, lines 50-68 a stamp to deposit patterns on a substrate, thus the stamp is the device used in Applicant's essential transfer of a pattern having an applicating surface. The teaching by Schnur sets forth what is known in the art and because it was known to have an applicating surface of complimentary patterns, it would have

been obvious to one having ordinary skill in the art to envision an applicating surface of complementary patters because the substrate carries the same patterns. Regarding the capability of an applicating surface or pattern, that a surface is able to direct formation, is not germane since it has been held that an element that is “being able to” perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson*, 69 USPQ 138. Language that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation.

Further regarding claims 12-13 switching the material between the first and second molecular species, it would have been obvious to switch them dependent upon where one desires the species bonding to take place as discussed above.

Claims 3-15, 55-59, 69, and 70-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prime and Whitesides, "Self-Assembled Organic Monolayers: Model Systems ...", Science, May 24, 1991, 252, pp 1164-1167 in view of USPN 4,728,591 to Clark et al.

Prime et al. teaches a device comprising a substrate coated with metal and a self-assembled monolayer of alkanethinols of two different materials (the same alkanethinol of Applicant’s specification found at page 34, Example 1),

hydrophilic and hydrophobic alkanethinols terminating (has an end) and polar groups (equivalent to the claimed terminating in an end away and at surface functionality) at the gold interface. This "mixed" SAM is on a gold film (a metal layer defining a surface, -the Examiner's interpretation is that "a surface" is the upper surface of the metal, at the interface of the SAM and gold) and on it is a silicon wafer (substrate). See the entire article, especially the Figures.

Prime et al. teaches a device comprising a substrate coated with metal and a self-assembled monolayer of alkanethinols of two different materials, hydrophilic and hydrophobic alkanethinols (claims 12-13), terminating (has an end) and polar groups (equivalent to the claimed terminating in an end away and at surface functionality) at the gold interface.

While the metal gold film taught in the journal is not palladium (claims 3-15, 55-59, 69, and 70-75), it is an obvious substitution because both gold and palladium are well known metals and because gold was a success, it would be expected that a similar known metal, especially in the same transition metals class in the periodic table, such as palladium also be successful.

Therefore, in view of the prior art, it would have been obvious to one having ordinary skill in the art to have modified the Prime et al. teaching of a gold layer for a layer of palladium because they are both in the same class of transition metals and because successful SAMS are built on gold, it is expected that the same or similar results be successful as well using palladium. Such modification is well within the purview of one having ordinary skill in the art

given similar materials used. Though we are fully cognizant of the hindsight bias that often plagues determinations of obviousness, Graham v. John Deere Co., 383 U.S. 1, 36 (1966), we are also mindful that "the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results," KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 1739 (2007).

Regarding the isolated region surrounded by a continuous region in the sizes as claimed, Prime teaches the SAMs on gold are supported on silicon wafers (embodies a semiconductor substrate). Prime does not explicitly teach (claims 3-10, and 70-73). Prime doesn't explicitly teach a nonplanar surface (claims 11, 14-15).

Clark, however, teaches the required ranges are suitable in microlithography patterns on silicon wafers. Clark teaches a device comprising an article comprising palladium metal defining a surface (col. 2, line 32, e.g. upper substrate surface or an upper metal surface). Clark teaches a metal coating as a film adjacent the substrate or an embedded pattern in nanometer dimensions in the upper layer of a silicon substrate (see 10a layered substrate, and 40 metal embedded and 42 metal island or continuous sheet of FIGS. FIGs. 8c, 8d, respectively, 7:60-68, 8:1-5, 11:55-65, 12:5-35), and an isolated region of a self-assembled monolayer of a first molecular species having a function (col. 2, lines 49-55, e.g. a functional material deposited through holes such as a protein molecules, equivalent to isolated regions should the pattern

include these) surrounded by a second molecular species on the surface (col. 2, lines 40-49, e.g. two-dimensional self-assembled molecular array of protein molecules equivalent to a continuous region should the pattern include these). Clark teaches an isolated region of a self-assembled monolayer of a first molecular species having a function (col. 2, lines 49-55, e.g. a functional material deposited through holes such as a protein and enzymes molecules) surrounded by a second molecular species on the surface and terminating in the same way (e.g. at the ends of the pattern as per Applicant's specification- see [0053-0059]) (col. 2, lines 40-49, FIG. 2 and associated text, two-dimensional self-assembled molecular array of protein and enzymes molecules). The isolated region in lateral dimension and area (encompassed by characteristic dimension) is between 1-50 nm (0.01-0.5 microns), meeting Applicant's range of less than about 10 microns, 5 microns, 1 micron, and 0.25 microns, less than 100 sq. microns, less than 25 microns, less than 1 sq. microns, and less than 0.06 microns, as the first material is surround by the pattern via the second molecular species, see col. 3, lines 56-59 and col. 4, lines 40-45. The area printed is at least patterned of several thousand nanostructures in one micron square area, meeting Applicant's area ranges (claims 7-10). Because all surfaces are patterned, they are nonplanar as taught by Clark (claims 11, 14, 15).

Further regarding claim 55, because it is unclear if there is a pattern and where it is the Examiner's position that because Clark patterns the substrate

as set forth above, having some applicability dependent upon its end use, one having skill in the art would expect the same pattern to correspond to the same pattern it is deposited on and would thus meet claim 55. Regarding the capability of an applicating surface or pattern, that a surface is able to direct formation, is not germane since it has been held that an element that is "being able to" perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson*, 69 USPQ 138. Language that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation.

The terminations of the second molecular species and the first being on and exposed away from the surface are dependent upon the selected material. Since Clark teaches the material that is self-assembled can be chemical, proteins, or polymers and other functionable materials (3:1-5, 14:1-65) (col. 13, line 60-col. 14, lines 1-40, col. 14, lines 50-col. 15, line 30, cationic polylysine serve to bind to anionic ferritin), and teaches in col. 16, lines 40-50, polymers that at both ends of its length, and at the respective terminus bind to adjacent islands (isolated regions), one would expect the material to perform functionally as claimed, while not explicitly recited in the same words. See also patented claims, Abstract, col. 2, lines 25-65, 8:1-25, and 10:45-65, 12:5-49, 13:40-65, 14:1-55, 16:50-60.

Thus, it would have been obvious to one having ordinary skill in the art to have modified Prime because Clark teaches the wafer having the required microlithography patterns in nanoscale with similar species to produce complex writing structures such as semiconductors or biosensors to allow shorter production times, differential current flow, and /or enhanced protein bonding dependent upon the end use of the device as cited above.

Further regarding claims 12-13 switching the material between the first and second molecular species, it would have been obvious to switch them dependent upon where one desires the species bonding to take place as discussed above.

Claims 55-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prime and Whitesides, "Self-Assembled Organic Monolayers: Model Systems ...", Science, May 24, 1991, 252, pp 1164-1167 in view of USPN 5,079,600 to Schnur et al.

Prime et al. teaches a device comprising a substrate coated with metal and a self-assembled monolayer of alkanethinols of two different materials, hydrophilic and hydrophobic alkanethinols terminating (has an end) and polar groups (equivalent to the claimed terminating in an end away and at surface functionality) at the gold interface. This "mixed" SAM is on a gold film (a metal layer defining a surface, -the Examiner's interpretation is that "a surface" is the upper surface of the metal, at the interface of the SAM and gold) and on it is a silicon wafer (substrate). See the entire article, especially the Figures.

Prime et al. teaches a device comprising a substrate coated with metal and a self-assembled monolayer of alkanethinols of two different materials, hydrophilic and hydrophobic alkanethinols, terminating (has an end) and polar groups (equivalent to the claimed terminating in an end away and at surface functionality) at the gold interface.

While the metal gold film taught in the journal is not palladium, it is an obvious substitution because both gold and palladium are well known metals and because gold was a success, it would be expected that a similar known

metal, especially in the same transition metals class in the periodic table, such as palladium also be successful.

Therefore, in view of the prior art, it would have been obvious to one having ordinary skill in the art to have modified the Prime et al. teaching of a gold layer for a layer of palladium because they are both in the same class of transition metals and because successful SAMS are built on gold, it is expected that the same or similar results be successful as well using palladium. Such modification is well within the purview of one having ordinary skill in the art given similar materials used. Though we are fully cognizant of the hindsight bias that often plagues determinations of obviousness, Graham v. John Deere Co., 383 U.S. 1, 36 (1966), we are also mindful that "the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results," KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 1739 (2007).

Regarding the pattern, Prime doesn't explicitly teach it within the dimensions specified (claims 55-59). Prime teaches the SAMs on gold are supported on silicon wafers (embodies a semiconductor substrate).

However, Schnur teaches a patterned monomolecular assembly having a nonplanar substrate such as a palladium coated on the surface of a silicon wafer (article) that exhibits excellent step coverage important in fabrication of the wafer used in semiconductor microlithography (Example 23, Abstract, Example 25), and a metal coating such as copper and palladium is treated on

the substrate (9:50-68, 8:2-9, 8:46- e.g. “treated at the surface with silicon...metal”, "the first layer can be one type of metal such as palladium”). Schnur also teaches a second species - functional group terminating at an end away (the star and triangle shapes illustrated on the nonpolar tails in Figs. 1A and 1B-see col. 9, lines 10-38) and another first molecular species silane molecule selected to bind the surface of the substrate (smallest circle touching the substrate surface) in a terminal end in a monomolecular self-assembling film being chemisorbed in the same way as Applicant (see Example 1, further to hydrophobic and hydrophilic functions, and 10:50-68). Schnur teaches microlithography, etching, and contact printing patterns (equivalent to forming isolated regions-see also the teaching and figures of patterning in FIG. 4A and 5B and col. 7) are used explaining the pattern line widths of any material including metal, having less than one micron and in Angstrom range (embraces all sizes (linear and area) less than 1 microns (see col. 7, especially lines 1-10, 50-68, overlapping Applicant’s lateral dimension ranges of claims 55-59 and 69-75) is suitable for high resolution spacing and microcircuit lithography (col. 1, lines 60-68, col. 5, lines 15-45, col. 6, lines 45-68, col. 7, col. 8, lines 1-68, col. 9, lines 10-68, col. 10, lines 1-4, lines 40-65, col. 11, lines 1-25, FIGS. 1A-3B , 5B and associated text) patterning on metal coated wafer substrates (instant claims 55-59, and 69-75 are addressed).

With regard to claim 55, Schnur teaching a stamp to deposit patterns on a substrate, thus the stamp is the device used in Applicant's essential transfer

of an applicating surface (see col. 4, lines 50-68.) The teaching by Schnur sets forth what is known in the art and because it was known to have an applicating surface of complimentary patterns, it would have been obvious to one having ordinary skill in the art to envision an applicating surface of complementary patters because the substrate carries the high resolution patterns.

Regarding the capability of an applicating surface or pattern, that a surface is able to direct formation, is not germane since it has been held that an element that is “being able to” perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson*, 69 USPQ 138. Language that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation.

Thus, it would have been obvious to one having ordinary skill in the art to have modified the Prime reference to include a palladium patterned substrate as claimed because Schnur teaches gold exchangeable for palladium and patterning in the ranges claimed to achieve high resolution printing as cited above.

Claims 3-15, 55-59, and 69-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 4,728,591 to Clark et al. in view of Prime and

Whitesides, "Self-Assembled Organic Monolayers: Model Systems ...", Science, May 24, 1991, 252, pp 1164-1167, or alternatively in view of USPN 5,079,600 to Schnur et al.

Clark teaches a device comprising: an article comprising metal defining a surface (col. 2, line 32, e.g. upper substrate surface or an upper metal surface). Clark teaches a metal coating as a film adjacent the substrate or an embedded pattern in nanometer dimensions in the upper layer of a silicon substrate (see 10a layered substrate, and 40 metal embedded and 42 metal island or continuous sheet of FIGS. FIGs. 8c, 8d, respectively, 7:60-68, 8:1-5, 11:55-65, 12:5-35), and an isolated region of a self-assembled monolayer of a first molecular species having a function (col. 2, lines 49-55, e.g. a functional material deposited through holes such as a protein molecules, equivalent to isolated regions should the pattern include these) surrounded by a second molecular species on the surface (col. 2, lines 40-49, e.g. two-dimensional self-assembled molecular array of protein molecules equivalent to a continuous region should the pattern include these). The isolated region in lateral dimension and area (encompassed by characteristic dimension) is between 1-50 nm (.01-.5 microns), meeting Applicant's range of less than about 10 microns, 5 microns, 1 micron, and 0.25 microns, less than 100 sq. microns, less than 25 microns, less than 1 sq. microns, and less than 0.06 microns, as the first material is surround by the pattern via the second molecular species, see col. 3, lines 56-59 and col. 4, lines 40-45. See another pattern as shown in

FIG. 3. See also patented claims and 3:55-68, 4:1-35, 5:50-68, 6:1-35, 7:60-68, 8:1-5, 15:50-60. The area printed is at least patterned of several thousand nanostructures in one micron square area, meeting Applicant's area ranges (claims 7-10).

The terminations of the second molecular species and the first being on and exposed away from the surface are dependent upon the selected material. Since Clark teaches the material that is self-assembled can be chemical, proteins, or polymers and other functionable materials (3:1-5, 14:1-65) (col. 13, line 60-col. 14, lines 1-40, col. 14, lines 50-col. 15, line 30, cationic polylysine serve to bind to anionic ferritin), and teaches in col. 16, lines 40-50, polymers that at both ends of its length, and at the respective terminus bind to adjacent islands (isolated regions), one would expect the material to perform functionally as claimed, while not explicitly recited in the same words. See also patented claims, Abstract, col. 2, lines 25-65, 8:1-25, and 10:45-65, 12:5-49, 13:40-65, 14:1-55, 16:50-60. Because all surfaces are patterned, they are nonplanar as taught by Clark (claims 11, 14, 15).

Clark while teaching in general a metal surface, doesn't teach palladium, but does use gold for bonding SAM protein materials on a silicon wafer (15:50-60, claim 55). Further the SAM material of Clark, being generally of any material (2:30-41, "chemical reactivity variations or other non-biological material), however, is not explicit to the functional properties as claimed (i.e.

the terminations of the first and second molecular species and the first being on and exposed away from the surface)-claims 3-15, 55, and 69.

Prime et al. teaches a similar device comprising a substrate coated with metal and a self-assembled monolayer of alkanethinols of two different protein materials, hydrophilic and hydrophobic alkanethinols (claims 12-13), terminating (has an end) and polar groups (equivalent to the claimed terminating in an end away and at surface functionality) at the gold interface. This "mixed" SAM is on a gold film (a metal layer defining a surface, -the Examiner's interpretation is that "a surface" is the upper surface of the metal, at the interface of the SAM and gold) and on it is a silicon wafer (substrate). See the entire article.

Schnur teaches similar device -a patterned monomolecular assembly having a nonplanar substrate such as a palladium coated on the surface of a silicon wafer (article) that exhibits excellent step coverage important in fabrication of the wafer used in semiconductor microlithography (Example 23, Abstract, Example 25), and a metal coating such as copper and palladium is treated on the substrate (9:50-68, 8:2-9, 8:46- e.g. "treated at the surface with silicon...metal", "the first layer can be one type of metal such as palladium"). Schnur also teaches a second species - functional group terminating at an end away (the star and triangle shapes illustrated on the nonpolar tails in Figs. 1A and 1B-see col. 9, lines 10-38) and another first molecular species silane molecule selected to bind the surface of the substrate (smallest circle touching

the substrate surface) in a terminal end in a monomolecular self-assembling film being chemisorbed in the same way as Applicant (see Example 1, further to hydrophobic and hydrophilic functions, and 10:50-68). Schnur teaches microlithography, etching, and contact printing patterns (equivalent to forming isolated regions-see also the teaching and figures of patterning in FIG. 4A and 5B) are used explaining the pattern line widths of any material including metal, having less than one micron and in Angstrom range (embraces all sizes (linear and area) less than 1 microns (see col. 7, especially lines 1-10, 50-68, overlapping Applicant's lateral dimension ranges of claims 55-59 and 69-75) is suitable for microcircuit lithography (col. 1, lines 60-68, col. 5, lines 15-45, col. 6, lines 45-68, col. 7, col. 8, lines 1-68, col. 9, lines 10-68, col. 10, lines 1-4, lines 40-65, col. 11, lines 1-25, FIGS. 1A-3B , 5B and associated text) patterning on metal coated wafer substrates (instant claims 55-59, and 69-75 are addressed).

While the gold film taught in the journal is not palladium, it is an obvious substitution because both gold and palladium are well known metals and because gold was a success, it would be expected that a similar known metal, especially in the same transition metals class in the periodic table, such as palladium also be successful.

The exemplified gold film of Schnur uses palladium as an equivalent to gold (8:1-50), and while not the preferred choice, palladium, because it is listed in the list with gold, is an obvious choice material. Reading a list and selecting

a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig-saw puzzle." 325 U.S. at 335, 65 USPQ at 301.). See MPEP 2144.06.

Thus, it would have been obvious to one having ordinary skill in the art to have modified the structure of Clark to include palladium, because both Prime and Schnur teach metals are suitable for coatings on the upper surface of a silicon substrate as cited above. Thus, it is well within ones ordinary skill to employ palladium as a coating on a substrate as set forth above.

Further regarding the nonplanar surfaces (claims 11 and 14-15), although Clark teaches patterning, the substrate surface is not etched (if this is the process that yields the claimed nonplanar surface).

Schnur teaches an etched substrate, inherently yielding a nonplanar surface as shown in FIG. 4A and 5A.

It would have been obvious to one having ordinary skill in the art to have modified Clark to include a nonplanar substrate surface and the material species because both Prime and Schnur teach similar species material on silicon wafer substrates and Schnur teaches etching is a way to achieve a similar pattern with similar species in an improved high resolution as cited above achieving improved properties dependent upon the desired end use of the device.

Further regarding claims 12-13 switching the material between the first and second molecular species, it would have been obvious to switch them

dependent upon where one desires the species bonding to take place as discussed above.

Response to Arguments

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TAMRA L. DICUS whose telephone number is (571)272-1519. The examiner can normally be reached on Monday-Friday, 7:00-4:30 p.m., alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Ruthkosky can be reached on 571-272-1291. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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